

GOVERNMENT OF INDIA  
METEOROLOGICAL DEPARTMENT

# INDIA WEATHER REVIEW, 1944

## ANNUAL SUMMARY

### PART C

## STORMS AND DEPRESSIONS

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## **Environmental Data Rescue Program**

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# INDIA WEATHER REVIEW, 1944.

## ANNUAL SUMMARY.

### PART C.

### STORMS AND DEPRESSIONS.

#### 1.—DEPRESSIONS AND CYCLONIC STORMS

During the year, six storms and ten depressions developed in the Bay of Bengal, one storm and one depression in the Arabian Sea, while two land depressions formed—one over Kathiawar and the other over west central India. The dates on which the storms occurred and the greatest barometric depths observed during their life history are summarised in the accompanying table.

Table 1.

Region	Month	Date	Greatest observed barometric depth.
1. Bay of Bengal .	Feb.-March	29th Feb.—5th March.	6 mb.
2. Do. .	July.	23rd—27th .	15 mb.
3. Do. .	July—Aug.	27th July—3rd August. .	15 mb.
4. Arabian Sea .	August .	14th—22nd .	17 mb.
5. Bay of Bengal .	August .	18th—25th .	13 mb.
6. Do. .	October .	24th—29th .	8 mb.
7. Do. .	November	5th—8th.	No data.

The detailed descriptions of these storms and depressions are followed by a list of western disturbances during the year. A list of the more important local storms and the damage caused by them is also added at the end.

**1. Bay of Bengal cyclonic storm from the 29th February to 6th March 1944.**—A northward extension of the seasonal 'low' over the southwest Bay of Bengal with a general strengthening of the northeasterly upper winds over Ceylon and the Coromandel coast in the evening of the 28th February, indicated that the weather was unsettled in the southwest Bay. Next morning the weather along and near the east coast of Ceylon deteriorated considerably and the isobaric charts together with the backing in the upper winds suggested that a depression had formed in the southwest Bay; its central region was located at 9 hrs. I. S. T. on the 29th February within 2° of Lat. 5°N., Long. 85°E. Widespread rain had by this time fallen in east Ceylon. The depression moved northnorthwestwards and was centred near Lat. 7°N., Long. 84° E. on the morning of the 1st March. Very heavy rain was reported from northeast Ceylon with widespread rain along and

near the adjacent parts of the Coromandel coast. Moving in the same direction as before, the depression was centred near Lat. 8½°N., Long. 83½°E. at 9 hrs. of the 2nd; the zone of bad weather extended northwards, while the northeastern parts of Ceylon continued to report very heavy rain. Moving northnorthwestwards and intensifying at the same time the depression probably became a cyclonic storm by 9 hrs. of the 3rd when it was centred near Lat. 11°N., Long. 83°E. The surface winds at Madras increased from force 5 (B. S.) at 3 hrs, to force 7 B. S.) at 9 hrs. Thereafter the storm moved north-westwards and was centred at 18 hrs. I. S. T. near Lat. 11½°N., Long. 82½°E. when it was probably severe. It took a westnorth-westerly course and at 9 hrs. I. S. T. of the 4th was centred about 100 miles to the southeast of Madras. It crossed the coast about 50 miles south of Madras during the afternoon of the same day, and at 18 hrs. I. S. T. was centred about 50 miles to the southsouthwest of Madras. Being in the northwestern quadrant of the cyclone, Madras began to experience fresh northeasterly gales from 9 hrs. of the 3rd, and even after the storm had passed inland on the 4th afternoon moderate to fresh easterly gales were blowing there. During the night of the 4th the storm weakened into a depression and was centred at 9 hrs. of the next morning about 30 miles to the northwest of Bangalore. Thereafter the depression rapidly weakened further being situated over west Mysore on the evening of the 5th and passed off westwards as a low pressure wave by the next morning.

Associated with the storm widespread and locally heavy rain fell along and near the Coromandel coast on the 2nd and 3rd and over the south of the Peninsula and in Ceylon between the 4th and the 6th.

Tables giving the district averages and particularly heavy falls are given below :—

TABLE 2.

District.	DISTRICT AVERAGES MARCH	
	4th.	5th.
Guntur .	...	27."
Nellore .	12."	3.6"
Chingleput .	2.2"	...
North Arcot .	1.8"	...

TABLE 3.

Particularly heavy falls.

District.	Station	MARCH				
		1st	2nd	3rd	4th	5th
...	Trincomalee	7	9	...	...	...
Chingleput	Poonamallee	...	...	5.9	...	...
North Arcot	Arkonam	...	...	...	6.3	...
Chingleput	Ponneri	...	...	...	5.6	...
North Arcot	Panapauk	...	...	...	5.0	...
Nellore	Udayagiri	...	...	...	...	10.3
Nellore	Kandukur	...	...	...	...	8.0
Nellore	Kavali	...	...	...	...	6.5
Guntur	Ongole	...	...	...	...	6.4
Guntur	Kanuparti	...	...	...	...	5.7

**2. Bay depression from the 20th to 22nd May 1944.**—Conditions were unsettled in the north Andaman Sea and neighbourhood from the 16th to 19th May and by the morning of the 20th a depression had formed with the central region at 0900 hrs. within 2 degrees of Lat.  $15^{\circ}\text{N}$ ., Long.  $92^{\circ}\text{E}$ . It took a north-northeasterly course and at 1800 hrs. I. S. T. of the 21st was centred near Lat.  $18^{\circ}\text{N}$ ., Long.  $93^{\circ}\text{E}$ . Continuing to move in the same direction, the depression crossed the Arakan coast somewhere between Akyab and Sandoway during the night of the 21st-22nd, and, lay over Central Burma by the mid-day of the 22nd May 1944.

The depression appears to have been responsible for rain over Arakan and Central Burma on the 21st and 22nd May 1944.

Owing to lack of observations the account of this depression is meagre.

**3. Depression of 13th-17th June in the Arabian Sea.**—With a strengthening of the Arabian Sea monsoon on the 10th weather became unsettled in the east central Arabian Sea. The unsettled conditions persisted there and became more marked on the 12th. By the 13th morning a depression formed off the Konkan coast, and widespread rain had extended along the west coast up to Bombay, Karwar recording 6." On the next morning the depression was centred near Lat.  $17^{\circ}\text{N}$ ., Long.  $70^{\circ}\text{E}$ . and moving in a north-northeasterly direction it crossed the Kathiawar coast between Veraval and Bhavnagar on the 15th. During the next 24 hours the depression became deeper while slowly moving north-northeastwards across Kathiawar. Thereafter it moved in a northeasterly direction and weakened over west Central India on the 17th.

With the formation and northward movement of the depression the Arabian Sea monsoon established itself in the Konkan and Gujarat, and there was widespread and locally heavy rain in the Konkan from the 12th and in Gujarat between the 14th and 16th, there was an extension of rainfall in west Central India between the 14th and 16th and in east Rajputana on the 16th and 17th. with a temporary extension into the United Provinces as well on the 18th.

The noteworthy district averages of rainfall are : Thana 2.3" (15th) and 3.4" (16th); Kolaba 2.1" (15th and 16th) and Surat 3.2" (17th).

TABLE 4.

The Particularly heavy falls are given below :—

District	Station	14th	15th	16th	17th	18th
		"	"	"	"	"
Savantwadi.	Savantwadi	6.1	5.8	...	...	...
"	Amboli	5.9	...	...	...	...
Kolhapur	Gagan Bavada	...	5.1	...	...	...
Baroda	Amreli	...	5.4	...	...	...
Idar	Idar	...	...	6.2	...	...
Junagad	Veraval	...	...	8.2	...	...
Palitana	Palitana	...	...	5.2	...	...
Baroda	Kalol	...	...	...	5.0	...
Ahmedabad	Prantij	...	...	...	5.1	...
Surat	Chikhli P.	...	...	...	6.5	...
"	Bulsar	...	...	...	5.1	...
"	Waghai D.	...	...	...	5.1	...
"	Dharampur	...	...	...	5.8	...
Bansda State	Bansda	...	...	...	8.5	...
Satara	Mahabaleshwar	...	...	...	7.6	...
Thana	Vada	...	...	5.4	...	...
Ratnagiri	Guhagar	...	...	...	...	8.4

**4. Deep depression of the 14th-16th June 1944 in the Bay.**—On the evening of the 11th June a fall of pressure was noticed along near the Circars-Orissa coast and the upper winds in the lower levels showed cyclonic circulation. The unsettled conditions persisted and by the morning of the 14th developed into a shallow depression over the head of the Bay of Bengal. During the next 24 hours the depression deepened, and by the next morning it was centred near Lat.  $21\frac{1}{2}^{\circ}\text{N}$ . Long.  $91^{\circ}\text{E}$ . Moving in a north-northeasterly direction it passed inland during the afternoon of the same date, weakened and was centred near Noakhali at 18 hrs. I. S. T. and about 100 miles to the east of Shillong on the morning of the 16th; on the next morning it was probably over north Burma.

In association with the depression widespread and locally heavy rain fell over southeast Bengal and Assam between the 13th and 17th, causing floods in the Jaintia, Kaulaghat and Govindghat areas in Assam. A sudden rain-storm on the 18th is reported to have caused the collapse of a building resulting in the death of 304 labourers at Karimpur in south Sylhet (Assam).

The noteworthy district averages and particularly heavy rainfall amounts are given below.—

## DISTRICT AVERAGES IN INCHES

## BENGAL.

Chittagong 2.2" on the 16th and 3.3" on the 17th.  
Chittagong (hill tracts) 2.4" on the 15th and 2.7" on the 17th.

## ASSAM.

Sylhet 3.8" on the 16th and 2.6" on the 17th.  
Cachar 2.5" on the 16th and 3.5" on the 17th.  
Sadiya Frontier Tract 2.7" on the 18th.  
Balajpara Frontier Tract 3.3" on the 18th.  
Lushai Hills 3.3" on the 16th and 3.7" on the 17th.



TABLE 7  
Particularly heavy falls.

District	Station	DATE						
		12th	13th	14th	15th	16th	17th	18th
<b>Orissa</b>		"	"	"	"	"	"	"
Cuttack	Chhendipada	7.7	...	...	...	...	...	...
<b>C.P. &amp; Berar</b>								
Bilaspur	Korba	...	10.3	...	...	...	...	...
Balaghat	Wara Main	...	9.1	...	...	...	...	...
"	Warasconi	...	8.5	...	...	...	...	...
"	Dongargaon	...	8.8	...	...	...	...	...
"	Baihar	...	8.1	...	...	...	...	...
"	Balaghat	...	7.2	...	...	...	...	...
"	Dhuti	...	...	8.3	...	...	...	...
Hoshangabad	Mohpani	8.2	...	...	...	...	...	...
"	Harda	...	...	...	11.4	...	...	...
"	Seoni	...	...	...	8.5	7.3	...	...
Nimona	Harsud	...	...	...	7.1	...	...	...
Amraoti	Dharni	...	...	...	7.6	...	...	...
<b>Central India</b>								
Ujjain	Ujjain	...	...	7.7	...	...	...	...
"	Soukach	...	...	9.6	...	...	...	...
Shajapur	Shajapur	...	...	8.2	...	...	...	...
"	Shujalpur	...	...	...	9.2	...	...	...
Nemawar	Ketaphor	...	...	...	7.7	...	...	...
Bhopal	Udaipura	...	8.5	...	...	...	...	...
"	Narsullaganj	...	...	...	8.5	...	...	...
Makrai	Makrai	...	...	...	12.7	...	...	...
Malwa	Jaora	...	...	...	7.0	...	...	...
<b>Bombay</b>								
Surat	Surat	...	...	7.0	...	...	...	...
Bansda State	Bansda	...	...	8.1	7.2	12.0	...	...
Surat	Bardoli	...	...	...	...	7.0	...	...
"	Valod	...	...	...	...	7.9	...	...
Broach	Kalol	...	...	...	...	...	8.0	...
Surat	Waghai	...	...	...	...	8.5	...	...
"	Ahwa	...	...	...	...	8.7	...	...
<b>Rajputana</b>								
Balanpur	Palanpur	...	...	...	...	...	8.9	...
Banswara	Garhi	...	...	...	...	8.8	...	...
"	Bhungra	...	...	...	...	7.3	...	...
"	Loharia	...	...	12.0	10.0	...	...	...
Dungarpur	Nithawa	...	7.3	...	...	...	...	...
Sirohi	Sirohi	...	...	...	7.9	...	...	...
"	Abu	...	...	...	...	7.0	14.2	10.7

**6. Land depression of 8th-10th July 1944 over Kathiawar.**—With the strengthening of the Arabian Sea monsoon in the first week of July a shallow land depression of small extent appeared over Kathiawar on the afternoon of the 8th when the upper winds at all levels over Veraval, Bhuj and Ahmedabad became cyclonic. The depression persisted there during the next day and became unimportant by the morning of the 10th.

The depression caused vigorous monsoon with locally heavy rain in Gujarat between the 8th and 10th.

Some of the Important heavy rainfall amounts are given below :

Sanand (Ahmedabad)	6.0"	(11th)
Chikli (Surat)	5.1"	(11th)
Pardi P. ( " )	5.8"	(11th)
Waghai ( " )	5.3"	(11th)
Dharampur ( " )	6.8"	(11th)
Dharampur ( " )	7.1"	(12th)
Bansda (Bansda State)	7.0"	(11th) and 5.4" (12th)
Morvi (Morvi State)	6.1"	(11th)
Porbandar (Porbandar State)	5.4"	(9th)
Mandvi (Cutch)	5.7	(11th)
Dwarka	6.9" (9th) and 6.0"	(11th)

**7. Depression of 13th-15th July 1944 in the Arabian Sea.**—The morning synoptic and upper air charts of the 11th July showed a closed cyclonic circulation over west Rajputana, probably the residue of the land depression which became unimportant over Kathiawar on the previous morning. The seasonal 'lows' over Baluchistan and Oman were also more marked on this morning. By 9 hrs. of the next day all the above 3 'lows' formed into an extended trough from the Gulf of Oman to southwest Rajputana. The trough became more marked by the morning of the 13th when it was extending from Oman to the Sind coast and by the evening of that day a shallow depression formed in the north Arabian Sea with centre at 18 hrs. I. S. T. near Lat.  $23\frac{1}{2}^{\circ}$  N., Long.  $64\frac{1}{2}^{\circ}$  E. Jiwani reported  $1\frac{1}{2}$ " during that day. Without appreciable change in position the depression persisted there during the next day, but weakened by the 15th morning and became unimportant.

Associated with this depression there was fairly widespread rain in south Baluchistan, Sind and west Rajputana between the 11th and 15th. Karachi recorded 2.4" on the 14th and Manora 2.8" on the 13th.

**8. Shallow Bay depression of the 17th to 22nd July 1944.**—On the morning of the 17th July conditions were unsettled over the head of the Bay of Bengal and an appreciable deterioration of weather was noticed in south Bengal. By the 18th morning the unsettled conditions developed into a shallow depression with the central region near Lat.  $21^{\circ}$  N., Long.  $89\frac{1}{2}^{\circ}$  E. It moved westnorthwestwards and was centred near Saugor Island at 18 hrs. I. S. T. of the same date. The depression moved inland during that night and, on the 19th, was centred near Midnapore at 9 hrs. and near Ranchi at 18 hrs. I. S. T. Thereafter it moved northwestwards and was centred about 50 miles southeast of Benares on the 20th morning. It continued to move in a north-westerly direction, weakened and was centred at 9 hrs. I. S. T. of the 21st about 50 miles northeast of Allahabad. Subsequently, it passed towards the United Provinces hills and became unimportant by the next morning.

In association with this depression locally moderate to heavy rain fell in southwest Bengal, Orissa, Bihar and the United Provinces.

The noteworthy district averages of rainfall and particularly heavy falls are given below.

TABLE 8.

Province and District.	District Averages		
	19th.	20th.	21st.
<b>ORISSA</b>	"	"	"
Puri	1.9	...	...
Sambalpur	...	1.6	...
<b>UNITED PROVINCES</b>	...	1.6	1.8
Mirzapur	...	...	1.7
Ballia	...	...	1.6
Azamgarh	...	...	...
Banda	...	2.3	...

TABLE 9.

Particularly heavy falls.

District.	Station.	18th.	19th.	20th.	21st.	22nd.
		"	"	"	"	"
Puri	Kakatpur	4.5	...	...	...	...
...	Gop	...	5.2	...	...	...
...	Pipli	...	5.2	...	...	...
Gorakhpur	Gorakhpur	...	...	...	...	4.9
Kheri	Kheri	...	4.5	...	...	...
...	Dholpur	...	...	...	...	6.5

**9. Cyclonic storm in the Bay, 23rd to 27th July.—**

Weather was unsettled in the northeast angle of the Bay of Bengal on the morning of the 22nd July, and there was a marked fall of pressure over southeast Bengal and Assam that evening due to a low pressure wave moving southwestwards across upper Burma. By the next morning a depression formed with its central region near Lat. 21°N., Long. 91°E. During the course of the next 24 hrs. it moved southwestwards and intensified into a cyclonic storm which was centred at 9 hrs. I. S. T. of the 24th near Lat. 20°N., Long. 89½°E., and at 18 hrs. about 30 miles south of Sandheads. Then the cyclonic storm moved rapidly northwestwards, crossed coast near Balasore by 6 hrs. I. S. T. of the 25th and weakened into a deep depression which was centred at 9 hrs. I. S. T. about 30 miles to the eastsoutheast of Chaibasa. Thereafter it moved westnorthwestwards, the subsequent positions of the centre being midway between Ranchi andendra at 18 hrs. of the 25th and near Saugor at 9 hrs. of the 26th. Moving practically in the same westnorthwesterly direction, the depression weakened and was centred about 100 miles to the west of Mount Abu on the morning of the 27th. On the next morning it was over Sind and later merged with the seasonal low over Baluchistan. The storm caused widespread and locally heavy rain along the region from Orissa and Bihar to Sind, particularly in Bhopal State, where the district average recorded on the 26th was 5.0", Khalia Kheri recording 11.6" on this date. According to newspaper reports

heavy downpours in north Gujarat caused heavy floods in the rivers Banas, Saraswati and Rupeni affecting the villages on the banks of these rivers. Several people were reported to have been drowned and crops over a wide area were washed away.

The statements showing noteworthy district averages and particularly heavy falls of rain in inches are given below.

TABLE 10

Province and District	District averages			
	24th	25th	26th	27th
<b>ORISSA</b>	"	"	"	"
Cuttack	...	3.7	...	...
Balasore	...	3.0	...	...
Puri	...	2.7	...	...
Sambalpur	3.5	3.0	...	...
<b>C. P. &amp; BERAR</b>				
Raipur	2.0	...	2.0	...
Bilaspur	2.1	...	...	...
Saugor	...	2.1	...	...
Jubbulpore	...	2.0	...	...
Mandla	...	2.5	...	...
Bhandara	...	...	2.2	...
Hoshangabad	...	...	3.2	...
Chhindwara	...	...	2.4	...
<b>SIND</b>				
Karachi	...	...	2.1	...
<b>CENTRAL INDIA</b>				
Bhilsa	...	4.9	...	...
Ujjain	...	2.1	...	...
Shajapur	...	5.0	...	...
Mandsaur	...	...	2.8	...
Narsingarh	...	...	2.8	2.0
Rajgarh	...	2.2	...	...
Ratlam	...	...	3.9	...
<b>RAJPUTANA</b>				
Banswara	...	...	...	3
Iklera (Kotah)	...	...	3.4	...

TABLE 11  
Particularly heavy falls of 7" and above.

District	Station	DATE			
		24th	25th	26th	27th
ORISSA		"	"	"	"
Cuttack	Patamundai	7.8	...	...	...
"	Jaipur	...	7.4	...	...
"	Dheramsala	...	7.5	...	...
Balasore	Bonth	7.3	...	...	...
Puri	Gop	...	9.7	...	...
Sambalpur	Dhama	8.9	...	...	...
"	Sambalpur	...	7.0	...	...
C. P. & BERAR					
Saugor	Rehli	...	7.5	...	...
CENTRAL INDIA					
Bhopal	Chilod	...	...	8.8	...
"	Gharatganj	...	...	7.0	...
"	Sehore	...	...	7.3	...
RAJPUTANA					
Palanpur	Palanpur	...	...	...	8.5
GUJARAT					
...	Sant	...	...	...	8.5

10. Severe Bay cyclonic storm from 27th July to 3rd August 1944.—On the evening of the 26th July a marked fall of pressure appeared over southeast Bengal and South Assam, and on the next morning a trough of low pressure appeared over the head of the Bay of Bengal. By the 28th morning the trough concentrated into a depression, centred at 9 hrs. I. S. T. near Lat.  $20\frac{1}{2}^{\circ}$  N., Long.  $89\frac{1}{2}^{\circ}$  E. Moving westward it was centred near Lat.  $20\frac{1}{2}^{\circ}$  N., Long.  $88\frac{1}{2}^{\circ}$  E. at 9 hrs. of the 29th. During the next 24 hours the depression moved very slowly and intensified into a cyclonic storm centred at 9 hrs. of the 30th close to Sandheads which reported a strong northeasterly gale. Moving westwards and intensifying at the same time, the storm became severe by 15 hrs. of the 30th and was centred at 18 hrs. about 30 miles east of Chandbali. It passed inland during early hours of the 31st, and by 3 hrs. it had weakened into a deep depression centred near Chandbali. Thereafter it took a rapid westnorthwesterly course and was centred about 60 miles east of Sambalpur on the morning of the 31st and near Jubbulpore on the morning of the 1st August. The deep depression weakened thereafter and was over south Rajputana on the next morning, and over Sind-Baluchistan border on the 3rd morning, subsequently merging with the seasonal 'low' over Baluchistan.

In association with this storm there was widespread and locally heavy rainfall over the belt of the country from the west Central Provinces to Rajputana and Sind in the Mekran and the Jalawan division of Baluchistan. It strengthened the Arabian Sea current which became vigorous at the beginning of August, causing very heavy rain in the north Konkan and Gujarat on the 1st and 2nd. Heavy rainfall caused floods in Karachi city, where, according to newspaper reports thirty thousand thatched houses were partially or wholly destroyed and over ten thousand people rendered homeless. Damage to municipal property alone was estimated to be over ten lakhs of Rupees. The following tables give the notable district averages of rain and the particularly heavy falls.

TABLE 12.  
DISTRICT AVERAGES

Province.	District.	Date				
		30th.	31st.	1st.	2nd.	3rd.
Orissa	Cuttack	2.1	4.4	...	...	...
...	Balasore	...	2.5	...	...	...
...	Puri	2.3	...	...	...	...
...	Sambalpur	...	2.2	...	...	...
...	Ganjam	...	2.1	...	...	...
...	Koraput	...	2.1	...	...	...
C. P. & Berar	Drug	...	...	2.7	...	...
...	Mandla	...	...	2.6	...	...
...	Bhandra	...	...	4.0	...	...
...	Nimar	...	...	3.2	...	...
...	Betul	...	...	4.6	...	...
...	Chhindwara	...	...	2.9	...	...
...	Nagpur	...	...	2.0	...	...
...	Amraoti	...	...	2.3	...	...
Central India	Indore	...	...	...	3.1	...
...	Bhopal (West District)	...	...	...	2.0	...
...	S. C. I. States Agency	...	...	3.1	...	...
...	Malwa Agency	...	...	2.1	...	...
Rajputana	Banswara	...	...	...	2.0	...
Sind	Karachi	...	...	4.0	...	...
...	Hyderabad	...	...	...	2.2	...
...	Thar Parkar	...	...	...	...	2.2
Bombay	Ahmedabad	...	...	...	3.7	...
...	Kaira	...	...	...	4.4	...
...	Broach	...	...	...	2.8	...
...	Thana	...	...	3.8	...	...
...	Kolaba	...	...	6.1	...	...
...	Ratnagiri	...	...	3.6	...	...

TABLE 13  
Particularly heavy falls of rain in inches.

District	Station	Date					
		30th.	31st.	1st.	2nd.	3rd.	4th.
		"	"	"	"	"	"
<b>ORISSA</b>							
Cuttack	Putamundai	10.6	...	...	...	...	...
"	Jaipur	...	10.8	...	...	...	...
"	Dharamsala	...	11.0	...	...	...	...
"	Jagatsingpur	...	9.0	...	...	...	...
"	Barchana	...	8.3	...	...	...	...
Balasore	Chandbali	9.3	...	...	...	...	...
<b>C.P. &amp; BERAR</b>							
Bhandara	Pangree	...	...	7.2	...	...	...
"	Chorkhamara	...	...	7.0	...	...	...
Betul	Betul	...	...	8.9	...	...	...
<b>SIND</b>							
Karachi	Karachi	...	...	8.5	...	...	...
"	Tatta	...	...	5.7	...	...	...
"	Sujawal	...	...	5.3	...	...	...
"	Jati	...	...	7.6	...	...	...
"	Manora (Obsy.)	...	...	...	5.9	...	...
Hyderabad	Tando Bago	...	...	...	4.7	...	...
"	Radin	...	...	...	4.1	...	...
Nawabshah	Sakrand	...	...	...	4.4	...	...
Dadu	Kotri	...	...	...	6.4	...	...
"	Kohistan	...	...	4.8	...	...	...
<b>BALUCHI-STAN</b>							
Kalat State	Saruna	...	...	...	...	4.7	...
"	Mashkai	...	...	...	...	...	5.6
"	Panjgur	...	...	...	...	...	3.4
"	Sonmiani	...	...	...	7.5	...	...
<b>BOMBAY</b>							
Savantwadi	Amboli	...	...	7.3	...	...	...
Jasdan	Jasdan	...	...	8.9	...	...	...
Kaira	Dakor	...	...	...	7.2	...	...
Kolaba	Roha	...	...	8.1	...	...	...
"	Mangaon	...	...	8.0	...	...	...
Ratnagiri	Mandangad	...	...	7.9	...	...	...
"	Dapoli	...	...	7.5	...	...	...
"	Khed	...	...	7.0	...	...	...

**11. Land Depression of the 11th to 15th August 1944.**—A shallow low pressure area developed over west Central India and southeast Rajputana on the 11th. The low pressure area moved slowly westnorthwestwards and intensifying after the 12th was centred near Bikaner on the 13th morning. Continuing to move northwestwards, the depression was over the north Rajputana and the southwest Punjab on the 14th morning and became unimportant by the 15th morning.

Associated with this depression there was fairly widespread rain in the central parts of the country, Gujarat, Rajputana, Sind and the Punjab between the 11th and 15th. The rainfall was locally heavy in west Central India and south Rajputana on the 12th and 13th, Barmer recording 11" on the morning of the latter date. Sibi district in Baluchistan also had widespread rain on the 13th and 14th.

The following table gives the particularly heavy amounts of rainfall in inches recorded during the period.

TABLE 14

Province and District	Station	Date			
		11th	12th	13th	14th
CENTRAL INDIA		..	..	..	..
Mandsaur	Gangapur	5.2	...	...	...
Bhopal	Udaipura	...	5.0	...	...
RAJPUTANA					
Jodhpur	Bali	...	6.5	...	...
"	Jalor	...	6.0	...	...
Barmer	Barmer	...	...	11.2	...
"	Chotan	...	...	10.0	...
Jaisalmer	Ramgarh	...	7.0	...	...
Kotah	Chipabarod	6.0	...	...	...
"	Iklera	5.2	...	...	...
Tonk	Chhabra	6.7	...	...	...
Udaipur	Kapasin	8.1	...	...	...
Sirohi	Sheoganj	...	7.0	...	...
SIND					
Karachi	Sujawal	...	4.5	...	...
Nawabshah	Tando Adam	...	5.1	...	...
"	Shahadapur	...	4.7	...	...
Khairpur	Khairpur Mirs	...	...	...	9.2

**12. Cyclonic storm of 14th to 22nd August 1944 in the Arabian Sea.**—On the morning of the 14th August a shallow 'low' formed over Chota Nagpur. This 'low' moved southwestwards, and on the morning of the 15th was centred about 50 miles to the southeast of Pendra and on the next morning near Seoni. Subsequently it deepened and rapidly moved westwards; it was centred about 100 miles southwest of Indore on the morning of the 17th and was close to Surat by the evening of the same day. By the following morning it emerged into the Arabian Sea and intensified further into a cyclonic storm off the Kathiawar coast being centred near Lat. 20°N., Long. 70½°E. at 9 hrs. of the 18th.

The cyclonic storm moved in a northwesterly direction and was centred at 18 hrs. of the 18th near Lat.  $20\frac{1}{2}^{\circ}\text{N}$ ., Long.  $68\frac{1}{2}^{\circ}\text{E}$ . The storm then moved westwards and weakened into a depression with centre near Lat.  $21^{\circ}\text{N}$ ., Long.  $67^{\circ}\text{E}$ . at 9 hrs. of the 19th. Its subsequent movement could not be definitely traced, except that after weakening further the residual circulation merged with the seasonal 'low' over Oman by the 22nd.

Associated with this storm there was widespread and locally heavy rain in the belt of the country extending from Chota Nagpur to the north Konkan and Kathiawar from the 15th to 19th. The rainfall was concentrated and exceptionally heavy in the Surat and Khandesh districts on the 17th and 18th. The district averages in Surat was as high as 8.5" on the latter date. Dharampur (Surat district) recorded 19.7" of rainfall on the 18th. According to newspaper reports, disastrous floods occurred in south Gujarat, especially in the Surat district. The Tapi and the other rivers in the district were in spate and Surat town was isolated. Many villages and hamlets were submerged or swept away. The Narbada and the Sabarmati rivers were also in flood. Cotton, groundnut and vegetable crops suffered over wide areas. Railway communication between Bombay and Kathiawar was cut off for nearly a fortnight. Damage was also done to crops in the Nasik and Khandesh districts.

Statement of noteworthy district averages of rainfall and particularly heavy amounts are given below :—

TABLE 15

Province & District.	District Averages			
	15th	16th	17th	18th
<b>C. P. &amp; BERAR</b>	"	"	"	"
Drug	2.3	...	...	...
Raipur	3.8	...	...	...
Chanda	...	2.9	...	...
Bhandara	...	2.7	...	...
Balaghat	...	2.2	...	...
Nimar	...	...	3.1	...
Betul	...	2.0	...	...
Wardha	...	4.0	...	...
Akola	...	...	3.1	...
Amraoti	...	...	2.8	...
Buldana	...	...	3.6	...
<b>CENTRAL INDIA</b>	...	...	...	...
Indore State-Nimar	...	...	3.3	...
Southern Central India	...	...	...	...
State Agency	...	3.1	...	...
<b>BOMBAY PROVINCE</b>	...	...	...	...
Surat	...	...	3.0	8.5
West Khandesh	...	...	5.5	...
East Khandesh	...	...	4.8	...
Nasik	...	...	3.0	2.8
Thana	...	...	2.1	3.8
Kolaba	...	...	...	3.5
Rajpipla	...	...	2.0	...

TABLE 16

Particularly heavy falls in inches.

District	Station	Date			
		15th	16th	17th	18th
<b>C. P. &amp; BERAR</b>		"	"	"	"
Raipur	Gariabund	10.1	...	...	...
"	Gattasilli	7.7	...	...	...
Akola	Akola Obsy.	...	...	8.6	...
"	Telhara	...	...	...	10.7
Buldana	Jalgaon	...	...	7.1	...
<b>CENTRAL INDIA</b>					
Bhopal Agency	Kakrai	...	7.2	...	...
<b>BOMBAY</b>					
Surat	Bulsar	...	...	...	16.5
"	Chikhli P.	...	...	...	15.3
"	Pardi P.	...	...	...	11.8
W. Khandesh	Pimpalner D.	...	8.3	...	...
"	Sindkheda	...	...	8.0	...
"	Shirpur	...	...	7.2	...
E. Khandesh	Bhusaval	...	...	8.6	...
"	Edalabad P.	...	...	8.3	...
"	Yaval	...	...	8.0	...
Nasik	Peint P.	...	...	...	8.1
Poona	Lonavla	...	...	...	8.0
Thana	Dahanu	...	...	...	9.6
"	Umbargaon	...	...	...	7.1
Kolaba	Matheran	...	...	...	9.9
Surat	Dharampur	...	...	...	19.7

### 13. Bay cyclonic storm—18th to 25th August 1944—

On the morning of the 15th August some reports from reconnaissance planes indicated that the winds over the east central Bay of Bengal at 1000 ft. had a feeble cyclonic circulation and that weather was unsettled there. The condition remained practically unchanged during the next two days. On the morning of the 18th the unsettled conditions developed into a depression centred at 9 hrs. I. S. T. near Lat.  $19^{\circ}\text{N}$ ., Long.  $89^{\circ}\text{E}$ . It moved slowly northwestwards and by 18 hrs of that day it was centred near Lat.  $19\frac{1}{2}^{\circ}\text{N}$ ., Long  $88^{\circ}\text{E}$ . Subsequently the depression rapidly intensified into a cyclonic storm and at 9 hrs. of the 19th was centred near Lat.  $20^{\circ}\text{N}$ ., Long.  $87^{\circ}\text{E}$ . By noon the storm crossed coast between Chandbali and Puri and weakened into a deep depression centred at 18 hrs. near Angul. On the next morning the centre was about 50 miles to the east of Raipur. The depression weakened further, moved northwestwards and was centred at 9 hrs. of 21st about 50 miles northeast of Seoni. The subsequent positions of the centre of the depression were between Bhopal and Guna on the morning of the 22nd, near Jaipur on the 23rd, near Sikar on the 24th and between Bikaner and Fort Abbas on the morning of the 25th. Thereafter the depression weakened still further and became unimportant by the evening of the 27th.

Associated with the storm there was widespread and locally heavy rain over the belt of the country extending from Orissa to Rajputana. The rainfall was exceptionally heavy in the Central Provinces. Central India and southeast Rajputana between the 21st and 23rd.

A statement showing noteworthy district averages and particularly heavy amounts of rainfall of 8" and above during the period of the storm are given below.

TABLE 17  
District Averages.

Province and District.	Date				
	19th.	20th.	21st.	22nd.	23rd.
	"	"	"	"	"
<b>ORISSA</b>					
Balasore	2.5	...	...	...	...
Puri	2.8	2.6	...	...	...
Ganjam	...	4.2	1.9	...	...
Koraput	...	2.4	...	...	...
<b>C. P. &amp; BERAR</b>					
Drug	...	2.2	2.2	...	...
Raipur	...	2.5	...	...	...
Chanda	...	4.3	5.0	...	...
Bhandara	...	...	2.0	...	...
Hoshangabad	...	...	3.2	2.2	...
Nimar	...	...	5.3	4.0	...
Betul	...	...	3.1	2.1	...
Wardha	...	...	3.6	...	...
Nagpur	...	...	2.8	...	...
Amraoti	...	...	5.6	...	...
<b>CENTRAL INDIA</b>					
Gwalior State Goona	...	...	2.7	...	...
Ujjain	...	3.8	5.1	1.8	...
Shajapur	...	...	6.2	3.4	...
Mandsaur	...	...	3.5	2.6	...
Sardarpur	...	...	5.2	...	...
Indore State	...	...	2.4	3.6	...
Nimar	...	...	1.9	3.9	...
Nimawar	...	...	6.4	4.6	...
Rampura Bhaupura	...	...	...	5.1	2.5
Mahidpur	...	...	...	6.7	2.8
Bhopal State Western District	...	...	3.3	3.6	...
Bhopal Agency Narsingarh...	...	...	...	4.6	...
Rajgarh	...	...	1.8	2.3	...
S. C. I. States Agency	...	...	4.3	2.0	...
Malwa Agency	...	...	4.3	3.6	...
<b>RAJPUTANA</b>					
Banswara State	...	...	1.6	5.6	2.6
Udaipur State	...	...	4.1	4.4	...

Table 18  
Particularly heavy falls.

District	Station	Date						
		19th	20th	21st	22nd	23rd	24th	25th
		"	"	"	"	"	"	"
<b>Orissa</b>								
Balasore	Soro	9.9	...	...	...	...	...	...
Puri	Khurda	...	8.3	...	...	...	...	...
Ganjam	Phiringia	...	10.0	...	...	...	...	...
"	Surada	...	8.4	...	...	...	...	...
<b>C.P. &amp; Berar</b>								
Chanda	Khairree	...	...	8.5	...	...	...	...
"	Ghorajheri	...	...	11.5	...	...	...	...
"	Chimur	...	...	8.6	...	...	...	...
"	Asola	...	...	8.8	...	...	...	...
"	Kunghari	...	...	9.1	...	...	...	...
Nimar	Harsud	...	...	8.0	8.8	...	...	...
Amraoti	Chikalda	...	...	11.1	...	...	...	...
"	Anjangaon	...	...	9.2	...	...	...	...
"	Dharni	...	...	8.1	...	...	...	...
<b>Central India</b>								
Ujjain	Ujjain	...	10.1	...	...	...	...	...
Indore State	Depalpur	...	...	...	8.3	...	...	...
Mahidpur	Mahidpur	...	...	...	9.3	...	...	...
Bhopal State	Jawar	...	...	...	8.8	...	...	...
Western Dist								
Bhopal Agency	Khujner	...	...	...	8.6	...	...	...
Narsingarh								
Makrai	Makrai	...	...	10.5	...	...	...	...
S. C. I. States	Rambapur	...	...	8.1	...	...	...	...
Agency								
"	Alirajpur	...	...	...	8.1	...	...	...
<b>Rajputana</b>								
Jodhpur State	Bilara	...	...	...	...	...	9.0	...
"	Jalor	...	...	...	...	10.3	...	...
"	Bali	...	...	...	...	8.7	...	...
Banswara State	Garhi	...	...	...	9.8	...	...	...
Tonk State	Nizammat	...	...	...	...	8.5	...	...
Udaipur State	Nimbahera	...	...	...	10.3	...	...	...
"	Dawer	...	...	...	...	...	...	...
"	Chitor	...	...	8.2	...	...	...	...
"	Kapasin	...	...	10.0	...	...	...	...
Kusalgarrh State	Kusalgarrh	...	...	...	9.1	...	...	...
Sirohi State	Sirohi	...	...	...	11.9	...	...	...
"	Abu	...	...	...	...	14.6	11.0	...
Barmer	Chotan	...	...	...	...	...	...	14.0
<b>Bombay States</b>								
Chhota Udepur	Chhota Udepur	...	...	...	8.0	...	...	...

14. Bay depression from 22nd August to 1st September 1944—Signs of the approach of a low pressure wave westwards through Burma were noticed on the 22nd by a marked fall of pressure over north Burma and the adjacent areas of Assam, the upper winds at Chittagong being light N-ly that evening. The fall of pressure extended westwards into Bengal by the 23rd morning, where upper winds had become N to NW. A shallow low pressure area extending from Chota Nagpur and South Bihar to Assam and the Arakan appeared on the 23rd morning. By the early morning of the 24th a depression had formed with centre near Lat.  $21^{\circ}$  N., Long.  $91^{\circ}$  E., and at 9 hrs. the depression was centered near Lat.  $21\frac{1}{2}^{\circ}$  N., Long.  $90\frac{1}{2}^{\circ}$  E. Moving slowly northwestwards and deepening, it crossed the coast just south of Barisal during the early hours of the 25th, being centred near Jessore at 9 hrs. The deep depression then moved westnorthwestwards and its centre was between Asansol and Hazaribagh on the morning of the 25th and near Gaya on the 27th morning. Thereafter it weakened and moved north-westwards as a shallow depression. The subsequent positions of the centre of the depression were near Benares on the 28th morning, about 50 miles east of Lucknow on the 29th, and about 60 miles northwest of Lucknow on the 30th. The depression remained more or less stationary for the next 48 hours and by the afternoon of the 1st of September it became unimportant.

Associated with this depression widespread and locally heavy rain fell in Bengal, Bihar and the United Provinces. The noteworthy district averages and particularly heavy falls of rain are given in the following tables.

TABLE 19  
District Average

Province & District	Date							
	25th	26th	27th	28th	29th	30th	31st	1st
<b>BENGAL</b>	"	"	"	"	"	"	"	"
24 parganas	2.7	...	...	...	...	...	...	...
Jessore	2.3	...	...	...	...	...	...	...
Burdwan	...	2.3	...	...	...	...	...	...
Bankura	3.8	3.2	...	...	...	...	...	...
Midnapore	2.3	...	...	...	...	...	...	...
Hoogly	3.1	...	...	...	...	...	...	...
<b>BIHAR</b>								
Shahabad	...	...	...	2.3	...	...	...	...
Ranchi	...	3.8	2.4	...	...	...	...	...
Palamau	...	...	3.0	...	...	...	...	...
<b>UNITED PROVINCES</b>								
Etawah	...	...	...	...	...	...	3.4	6.9
Cawnpore	...	...	...	...	3.0	9.2	...	4.0
Fatepur	...	...	...	...	5.1	...	...	...
Allahabad	...	...	...	2.9	5.9	...	...	...
Benares	...	...	...	3.7	...	...	...	...
Mirzapur	...	...	...	5.0	...	...	...	...
Agra	...	...	...	...	...	...	...	2.3
Mainpuri	...	...	...	...	...	...	...	1.9

TABLE-20

Particularly heavy falls.

District	Station	DATE									
		23rd	24th	25th	26th	27th	28th	29th	30th	31st	1st
<b>BENGAL</b>		"	"	"	"	"	"	"	"	"	"
Bankura	Gangajalghati	...	...	...	8.5	...	...	...	...	...	...
"	Bankura	...	...	...	6.8	...	...	...	...	...	...
"	Barjora	...	...	...	7.0	...	...	...	...	...	...
Midnapore	Ghatal	6.5	...	...	...	...	...	...	...	...	...
"	Chandrakona	...	6.7	...	...	...	...	...	...	...	...
"	Tamluk	...	...	6.7	...	...	...	...	...	...	...
"	Amlagura	...	...	...	7.3	...	...	...	...	...	...
"	Silda Belpahari)	...	...	...	6.7	...	...	...	...	...	...
Hooghly	Tarakeswar	...	7.0	...	...	...	...	...	...	...	...
Chittagong	Mirsarai	...	...	6.5	...	...	...	...	...	...	...
<b>BIHAR</b>											
Shahabad	Sasaram	...	...	...	...	...	7.3	...	...	...	...
<b>UNITED PROVINCES</b>											
Etawah	Auraiya	...	...	...	...	...	...	...	...	8.8	8.7
Cawnpore	Bhognipur	...	...	...	...	...	...	...	...	18.0	...
"	Derapur	...	...	...	...	...	...	...	...	9.4	10.4
"	Ghatampur	...	...	...	...	...	...	...	...	7.8	...
"	Akbarpur	...	...	...	...	...	...	...	...	6.5	...
Jalaun	Kalpi	...	...	...	...	...	...	...	...	12.1	...
"	Kunch	...	...	...	...	...	...	...	...	7.1	...
Mirzapur	Robertsganj	...	...	...	...	...	7.5	...	...	...	...

15. Deep Bay depression from the 24th September to 4th October 1944—A trough of low pressure appeared off the Circars-Orissa coast on the 24th morning and slowly shifted to the north Bay. The upper winds over Cuttack became E-ly upto 10,000 ft. by the 26th evening and on the next morning Calcutta upper winds also became E-ly. By the evening of the 28th a complete upper air circulation had established itself over the north Bay and on the 29th morning a depression

formed with its centre near Lat.  $19\frac{1}{2}^{\circ}$  N., Long.  $89^{\circ}$  E. Moving westnorthwestwards and intensifying at the same time, the depression was centred near Lat.  $20^{\circ}$  N., Long.  $87\frac{1}{2}^{\circ}$  E. on the morning of the 30th September. It crossed the coast near Chandbali during the night and moving rapidly inland lay with its centre between Sambalpur and Pendra on the 1st morning. Continuing to move in the same direction, the position of its centre on the 2nd was between Saugor and Hoshangabad. It weakened thereafter and lay as a shallow 'low' over southeast Rajputana on the subsequent two days and filled up later.

The depression caused widespread and locally heavy rain in Orissa southeast Bengal, Chota Nagpur and the Central Provinces.

TABLE 21 (a)

District Averages of rainfall.

Province & District	Date	
	1st	2nd
<b>ORISSA</b>		
Cuttack	1.5	...
Balasore	1.0	...
<b>C. P. &amp; BERAR</b>		
Bhandara	...	1.6
Balaghat	...	2.9
Hoshangabad	...	1.7
Betul	...	1.1
Chhindwara	...	2.3

TABLE 21 (b)

Particularly heavy falls.

District	Station	Date	
		1st	2nd
<b>ORISSA</b>			
Cuttack	Barchana	6.1	...
<b>C. P. &amp; BERAR</b>			
Drug	Gandai	6.0	...
Balaghat	Waraseoni	...	4.6
"	Katangjhiri	...	4.8
Hoshangabad	Pachmarhi	...	5.7
Chhindwara	Tamai	...	6.9

**16. Deep Bay depression from the 2nd to 6th October 1944.**—On the evening of the 1st October, the isobaric and the upper wind charts indicated a low pressure area over north Burma and the adjoining parts of Assam and southeast Bengal. On the next morning the 'low' was over the north Arakan and the adjoining areas of the northeast Bay causing unsettled weather there. The winds over north Burma, Assam and southeast Bengal showed a cyclonic circulation up to 3000ft. By the mid-night of the 2nd, a depression formed with its centre near the estuary of the Meghna river. Moving parallel to the Sundarban coast and intensifying at the same time, it lay as a deep depression centred near Lat.  $21\frac{1}{2}^{\circ}$  N., Long.  $88\frac{1}{2}^{\circ}$  E. at

9 hrs. I. S. T. of the 3rd. The deep depression crossed the coast northwest of Saugor Island by 1300 hrs. of the same day, and it was centred about 60 miles southwest of Midnapur at 18 hrs. I. S. T. and was about 50 miles south of Daltonganj on the 4th morning. Thereafter it weakened, and moving in the same direction was centred near Fatehpur on the morning of the 5th. Weakening further it recurved and moved northeastwards as a low pressure area which became unimportant by the 7th.

In association with this depression widespread and locally heavy showers occurred in northeast India and the east United Provinces. The noteworthy district averages and some of the particularly heavy falls of rain in inches are given below :

TABLE 22

District Averages

Province & District,	Date				
	2nd	3rd	4th	5th	6th
<b>BENGAL</b>	"	"	"	"	
Howrah	...	2.5	...	...	...
<b>BIHAR</b>					
Saran	...	...	...	1.7	...
<b>UNITED PROVINCES</b>					
Muzaffarnagar	...	...	...	2.5	...
Meerut	...	...	...	2.3	...
Bulandshahr	...	...	...	2.2	...
Gorakhpur	...	...	...	4.2	2
Basti	...	...	...	2.2	...

TABLE 23

Particularly heavy falls,

District	Station	Date				
		3rd	4th	5th	6th	7th
<b>Bengal</b>						
Midnapore	Ramnagar	6.0	...	...	...	...
Jalpaiguri	Alipur Duars	...	...	...	...	4.9
<b>Orissa</b>						
Cuttack	Aul	6.2	...	...	...	...
<b>United Provinces</b>						
Muzaffarnagar	Kairana	...	...	4.7	...	...
Gorakhpur	Deoria	...	...	6.1	...	...
"	Pharenda	...	...	6.8	5.9	...

**17. Deep depression in the Bay from the 14th to 19th October 1947.**—Aircraft reports on the morning of the 12th October indicated the existence of markedly unsettled conditions in the west central and the adjoining southwest Bay of Bengal. These conditions persisted there on the next day and by the 14th morning a shallow 'low' formed with central region within a degree of Lat.  $13\frac{1}{2}^{\circ}$ N., long.  $85\frac{1}{2}^{\circ}$ E, pressures had begun to fall along the north Madras coast. As judged by the strength of upper winds at Vizagapatam, Masulipatam and Madras the cyclonic circulation was well-marked up to 7000 ft. The 'low' concentrated into a depression, probably deep, by the morning of the 15th when it was centred near Lat.  $15^{\circ}$ N., Long.  $83^{\circ}$ E. The pressure continued to fall along the north Madras coast, Masulipatam recording a negative pressure departure of 7 mb. on the 16th morning. Moving northwestwards the deep depression was about to cross the coast between Masulipatam and Cocanada at 9 hrs. I. S. T. of the 16th and had given very heavy rain in the coastal region stretching from Balasore to Masulipatam. Masulipatam recorded 10", Ongole 7" and Cocanada 6" on the morning of the 16th. The depression crossed coast between Masulipatam and Cocanada about 14 hrs. I. S. T. and weakened thereafter; but continuing to move in the same direction it was centred about 100 miles east of Hyderabad on the 17th morning. Thereafter, its course took a southwestward trend and consequently the depression rapidly filled up.

Associated with the depression widespread and locally heavy rain fell in the coastal districts of the Circars Orissa, in southwest Bengal and Hyderabad between the 14th and 18th—

Statements of noteworthy district averages and particularly heavy amounts of rainfall in inches are given below.

TABLE 24

District Averages.

Province & District,	Date	
	15th	16th
<b>ORISSA</b>		
Balasore	...	3.5
Puri	2.6	2.3
<b>MADRAS</b>		
East Godavari	...	4.5
West Godavari	...	4.8
Kistna	...	4.8
Guntur	...	5.0

TABLE 25  
Particularly heavy falls.

District	Station	Date	
		15th	16th
<b>ORISSA</b>			
Balasore	Soro	...	9.8
Puri	Pipli	7.0	...
"	Gop	...	7.7
<b>MADRAS</b>			
East Godavari	Ramachandrapur	...	7.2
"	Salkhinetiipalli	...	12.4
"	Vella Lock	...	8.5
"	Yerrapotavaram Lock	...	9.2
"	Cocanada Lock	...	7.0
"	Chintapalli Lock	...	8.7
West Godavari	Narasapuram	...	11.0
"	Mogalturru	...	14.4
Kistna	Masulipatam	...	9.9
"	Pandraga	...	7.4
"	Manginapudi	...	8.1
"	Tidal Bandar Lock	...	8.6
"	Akkumarru Lock	...	8.6
"	Lakshimpuram Lock	...	12.1
"	Kodur	...	7.2
Guntur	Santaravur	...	7.5
"	Chinaganjam	...	7.6
"	Ongole	...	8.6
"	Kanuparti	...	7.8
"	Kollimerla Lock	...	7.9
"	Pedaganjam	...	8.7

**18. Bay cyclonic storm from the 24th to 29th October 1944.**—Aircraft reports on the 20th morning located a region of showers in the central Bay about Lat.  $15^{\circ}$ N., and on the 21st conditions were markedly unsettled in the central and the adjoining southern Bay. Heavy rain fell in the south Coromandel coast on that day, Pamban having 3" and Negapatam 2". The unsettled conditions apparently persisted without appreciable change for the next two days. The upper winds along the Coromandel and the east coast of Ceylon strengthened by the 24th evening and on the 25th morning relatively large negative changes and departures of pressures appeared along the south Coromandel coast. The upper winds continued strong and continuous rain was falling along the coast from Masulipatam

to Cuddalore; these suggested that a depression formed in the southwest Bay with central region within a degree of Lat.  $12^{\circ}\text{N}$ ., Long.  $84\frac{1}{2}^{\circ}\text{E}$ . Moving northwestwards the depression rapidly deepened into a cyclonic storm probably severe and was centred at 18 hrs. I. S. T. near Lat.  $13^{\circ}\text{N}$ ., Long.  $83^{\circ}\text{E}$ . about 150 miles east of Madras. Madras reported surface wind of beaufort force 7 and rough seas, while the upper winds over Madras at 5000 and 7000 ft, had reached hurricane force. Moving now in a westnorthwesterly direction, The storm was centred about 50 miles northeast of Madras at 3 hrs. of the 26th. It crossed the coast at about 5 hrs. just south of Nellore where winds reached gale force at that time. The storm thereafter weakened and lay as a deep depression near Cuddapah at 9 hrs. of the 26th. By the next morning it had weakened further and lay near Bellary. The depression now shifted its course towards north-northwest and moved over rapidly to Sholapur by 18 hrs. of the same day. It then moved northwestwards to cross the west coast of the Peninsula near Bombay by 9 hrs. of the 28th, and at 18 hrs. was centred near Lat.  $19^{\circ}\text{N}$ ., Long.  $71^{\circ}\text{E}$ . Thereafter the depression recurved northeastwards and entering the Gulf of Cambay, was lying near Bhavnagar at 18 hrs. of the 29th. it filled up by the next evening.

In association with this storm, widespread and locally heavy rainfall occurred along and near the Coromandel coast and in Hyderabad, the Bombay Deccan and the Konkan during the period 25th to 29th October.

TABLE 26  
District Averages

District	Dates				Particularly heavy falls,
	26th	27th	28th	29th	
Nellore	"	"	"	"	"
Chingleput	2.26	...	...	...	Tada, 89" on 26th
Chittoor	4.50	...	...	...	Voyalur 16.7"; Attiputu 13.7"; Ponneri 12.9"; Satyavedu. 6.4" and Vallur 13.5" on 26th,
Satara	4.48	...	...	...	Tirupati 9.7"; Chandra giri 9.0" Bhaharepet 91" on 26th.
Ratnagiri.	...	...	2.66	...	Panchgani 5.0; Patan 5.1; Vita 5.7" on 28th.,
Nasik	...	...	2.53	...	
Poona	...	...	...	1.52	
	...	...	...	1.17	

**19. Bay cyclonic storm from the 5th to 8th November 1944**—Aircrafts in the east central Bay reported overcast skies and northerly moderate winds on the morning of the 4th November and heavy continuous rain and showers on the next morning. Reports from deltaic Burma pointed out that a low pressure wave was apparently travelling from the east while the upper winds up to 2 km. over India showed an incursion of northerlies into the Peninsula. Thus by the morning of the 5th conditions were markedly unsettled in the region round Lat.  $11^{\circ}\text{N}$ ., Long  $90^{\circ}\text{E}$ . By 18 hrs. of the same day, the winds had considerably strengthened and a depression had formed whose centre could be located within 100 miles of Lat.  $12\frac{1}{2}^{\circ}\text{N}$ ., Long.  $90\frac{1}{2}^{\circ}\text{E}$ . No observations were available from the disturbed area for about 24 hrs. until the evening of the 6th when hurricane winds were reported by an aircraft at a height of 1000 ft. suggesting that the depression had intensified into a cyclonic

storm. The position of its centre could not be fixed at that time for want of the observations, but at 9 hrs. I. S. T. of the 7th the centre of the cyclonic storm could be placed within a degree of Lat.  $15^{\circ}\text{N}$ ., Long.  $90^{\circ}\text{E}$ . Widespread rain with strong winds and rough seas was occurring in the east central and the adjoining northeast Bay. Reports received in the evening of the 7th suggested that the storm had already weakened into a depression and was moving in a northeasterly direction. On the next morning the depression was centred within a degree of Lat  $18^{\circ}\text{N}$ ., Long.  $92\frac{1}{2}^{\circ}\text{E}$ . Subsequently it weakened and filled up.

In association with this cyclonic storm widespread rain occurred over deltaic Burma and the east central Bay from the 5th to 9th.

**20. Deep depression in the Bay of Bengal from the 25th to 30th November 1944.**—The northeast monsoon had been strong in the southwest Bay from the 18th to 23rd. On the latter day an incursion of the southwest monsoon air into the extreme south Peninsula and the southwest Bay was shown by the winds at Mannar, Trivandrum, Cochin and Trichinopoly being southerly up to 2 km. Aircraft reports on the 24th and 25th morning also indicated that conditions were slightly unsettled in the southwest Bay off Ceylon. During the next two days there was considerable strengthening of the upper winds along the south Coromandel and east Ceylon coasts and by the 22nd morning the winds at Trincomalee had become NW: ly. A clearing of the weather in the south Peninsula on the 26th and 27th confirmed the inference that northerly air was sweeping over that area, being drawn into the region of the unsettled conditions off Ceylon. Trincomalee reported surface wind N-ly force 6 and rough seas of the 27th evening, by which time a depression had probably formed with central region near Lat.  $8^{\circ}\text{N}$ ., Long.  $87^{\circ}\text{E}$ . By the next morning the depression had deepened as was seen from a large number of aircraft reconnaissance reports from the southwest Bay giving strong cyclonic winds, rough seas and widespread rain. Stations in Ceylon and the south Coromandel coast were experiencing heavy rain. At 9 hrs. of the 28th the deep depression was centred within a degree of Lat.  $11^{\circ}\text{N}$ ., Long.  $86^{\circ}\text{E}$ ., and moving in a westnorthwesterly direction it was centred near Lat.  $12^{\circ}\text{N}$ ., Long.  $84^{\circ}\text{E}$ . by 18 hrs. of the same day. Strong winds and rough seas were experienced by the stations in the south Coromandel coasts throughout the 28th. The depression then moved westwards and was centred at 9 hrs. I. S. T. of the 29th near Lat.  $12^{\circ}\text{N}$ ., Long.  $82^{\circ}\text{E}$ . Thereafter it showed a tendency to move south-westwards and weakened very rapidly. At 9 hrs. of the 30th it lay as a trough of low pressure extending from the Gulf of Mannar to the southwest Bay of Bengal and became unimportant by the next day.

Associated with the depression fairly widespread rain fell in the south Peninsula and Ceylon during the period 27th to 30th.

## II. ACCOUNT OF WESTERN DISTURBANCES DURING 1944.

Most of the western disturbances in 1944 were feeble. They had marked activity only from the last week of January to the end of February, while during therest of the year, the disturbances were generally weak and caused little weather. One western disturbance in the beginning of April was, however, very active and caused widespread thundershowers with a large number of hail-storms over the region from N-W. F. P. and upper Sind to Bihar and Orissa and also in north Central India and the north Central Provinces.

A list of 57 disturbances, classified according to the nature of precipitation caused by them is given in the table below. Descriptions of some important disturbances are also added.

TABLE 27

Nature of precipitation,	Number of western Disturbances											
	Jan.	Feb.	Mar.	April.	May.	June.	July.	August.	Sept.	October.	Nov.	Dec.
Widespread	2	3	2	1	2	0	0	0	1	0	0	2
Local or scattered	4	3	5	4	1	2	0	0	1	1	4	3
Little or nil	2	1	1	2	4	0	0	0	1	1	1	3
No. of disturbances in each month.	8	7	8	7	7	2	0	0	3	2	5	8

#### 1. Western disturbances of 21st to 27th January.—

A western disturbance began affecting the northwest frontier on the 21st January and lay as a low pressure area over the Punjab from the 22nd to 24th. On the 25th it moved over to the United Provinces. In the meantime another quickly following disturbance reached the northwest frontier on the 24th and rapidly moving eastward merged with the first by the 26th. The combined disturbance moved eastwards to Bengal and Assam. These two disturbances were together responsible for local to widespread precipitation along the northwest frontier, in Kashmir, the Punjab hills, Rajputana and the United Provinces from 22nd to 24th and in the Sub-Himalayan region from the United Provinces to Assam during the 24th and 25th.

#### 2. Western Disturbance of 15th to 19th February

1944.—On the 15th February a western disturbance began affecting the northwest frontier. Taking a more southerly course than usual, it lay as an extended low pressure area from the Deccan to the west United Provinces and the Punjab on the

18th. The trough gradually shifted eastwards through Bihar into Bengal. In association with this disturbance widespread precipitation occurred from N—W. F. P. and Punjab to Bengal and in the central parts of the country between the 17th and 19th. Local thunderstorms occurred in Hyderabad also.

#### 3. Western Disturbance of 1st to 4th April 1944.—

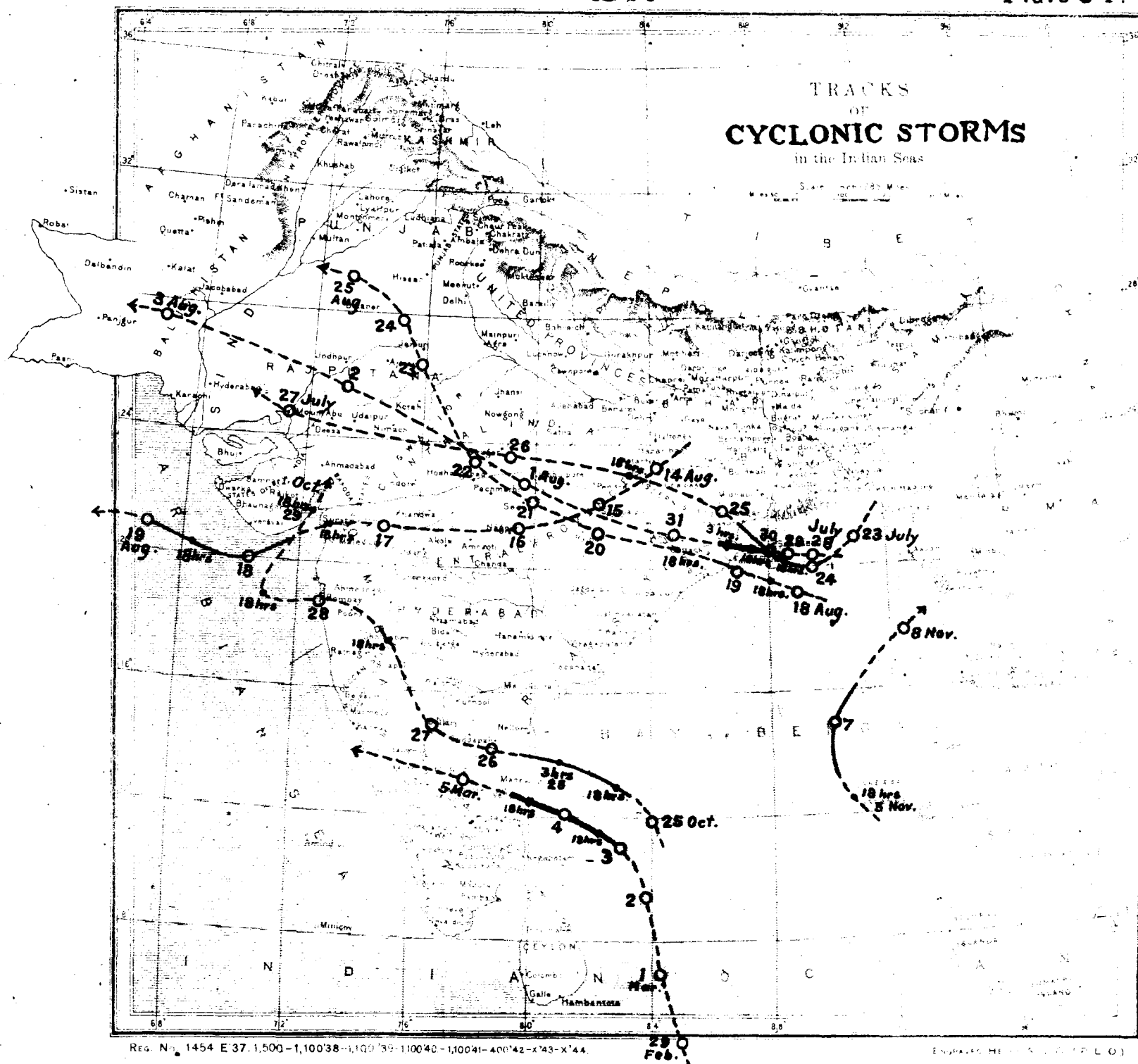
A western disturbance affected the northwest frontier on the 1st April and induced a trough of low pressure over Rajputana and neighbourhood. By the next day the disturbance became occluded but continued to move eastward through the United Provinces into Bihar. This disturbance was responsible for widespread and locally heavy rainfall with numerous hailstorms in the belt from the N—W. F. P. and Upper Sind to Bihar and Orissa from 1st to 4th. Local showers fell in Assam and Bengal on the 5th and 6th. In the wake of this disturbance mean temperatures were 10° to 15°F below normal in the northern and central India and considerable damage to crops due to frost was reported from the United Provinces, Central India and Bengal.

## III. LOCAL STORMS.

Some of the noteworthy local storms reported in newspapers are given below :—

Place	Date	Time	Character of storm	Loss of human life	Remarks.
Kalna ( Bengal )	January 29th	Afternoon	Violent thunder Storm	3	A boat carrying school-boys capsized in the river Bhagirathy. Three of the occupants were missing.
Bankura ( Bengal )	January 29th	Night	Hailstorm	...	Hailstones bigger than tennis balls fell for about half an hour. Herds of cattle were killed and the roofs of cutcha houses were blown away.
Bhandaria ( Bengal )	January 29th	Afternoon	Violent hailstorm	about 60	An inland steamer sank in the Kacha river. Two boats carrying a marriage party capsized. A large number of trees were uprooted and many houses collapsed. Rabi crops suffered damage.
Noakhali ( Bengal )	January 30th	...	Violent thunder-storm	...	Several persons were drowned and two boat-loads of cargo were lost when two passenger-carrying boats and two country boats capsized in the storm.
Meghna River ( Bengal )	February 19th	Night	Thunderstorm	...	A country boat capsized and some of the passengers lost their lives.
Sholapur ( Bom. Deccan )	March 14th	Evening	Hailstorm	...	The storm was accompanied by heavy rain and strong winds. Many trees were uprooted. Crops damaged.
Kharangana ( C. P. )	March 15th	Night	Violent thunder-storm.	2	Three persons were seriously injured.
Wardha ( C. P. )	March 15th	Night	Violent thunder-storm.	...	Several buildings damaged. Trees were uprooted. Electric lighting and telegraphic communications interrupted.
Dahanu ( Bombay )	March 28th	...	...	...	A westerly gale blew away tiles from the roofs of some houses. Several trees were uprooted.
Hyderabad, Larkana and Nawabshah Districts,	Mar. 22nd to 28th	...	Heavy hailstorms on many days during the week.	...	Considerable damage done to fruit and vegetable gardens. More than a third of the fruit crop was destroyed.
Ahmedabad ( Bombay )	April 2nd	Evening	Thunderstorm	2	About fifty people injured. Two persons sustained burns while taking observations in the observatory. Trees were uprooted, roofs of houses were blown off and some houses collapsed.
Gopalganj ( Bengal )	April 12 th	Afternoon	Hailstorm	...	Damage caused to standing crops and fruits especially mangoes and lichi.
Palang Thana ( Madaripur, Bengal )	April 13th	...	Tornado	...	Many lives lost. Considerable damage caused to property in about a dozen villages. Several persons were reported to be missing.
Munshiganj ( Dacca, Bengal )	April 14th	...	Hailstorm	...	A number of huts were blown away and damage was done to standing crops.
Oranati Gazipur Hatnari and Sherpur ( Orissa )	April 15th	...	Tornado	...	Some houses collapsed and 12 persons were injured.
Dacca ( Bengal )	April 18th	Night	Violent thunder-storm.	...	Electric supply was cut off for several hours.
Jessore ( Bengal )	April 18th	Night	Thunderstorm	...	Strong gales and heavy showers caused considerable damage to mango crop. A number of trees were uprooted and many huts blown off.
Comilla ( Bengal )	April 18th	Night	Thunderstorms	...	Considerable damage to crops and many houses.
Burdwan ( Bengal )	April 19th	Night	Tornado	...	Many trees were uprooted and roofs of houses blown away. Mango crop was badly damaged all over the district.
Surat (Gujarat) and adjoining Districts.	April 22nd to 25th	...	Hailstorm	...	Cotton and mango crops were badly damaged.

Place	Date	Time	Character of storm	Loss of human life	Remarks.
Karuvannur ( Malabar )	April 29th	...	Thunderstorm	1	A tea-shop was struck by lightning <sup>1</sup> causing injuries to nine persons.
Ullapara, Salap. Panchakshi and neighbouring Villages ( Malabar )	May 17th	Evening	Thunderstorm	...	Huts were blown off at some places and considerable damage was done to mango crop.
Sivasamudram ( Mysore )	May 19th	19, 30 hrs. I. S. T.	Thunderstorm	...	Lightning struck the generating station at Sivasamudram and caused severe damage to the building, generating units, cables and low tension switchgears. There was an outbreak of fire.
Rajshahi ( Bengal )	May 19th	Afternoon	Thunderstorm	...	Many huts were blown off. Big trees uprooted. A number of people injured.
Damlur ( near Benglore )	May 14th	Evening	Thunderstorm	1	Twenty persons injured. The severe squall blew off roofings made of corrugated sheets.
Raigrah	May 31st	...	Severe thunderstorm	12	A number of houses blown off. All the houses in a village were razed to the ground.
Madhabdi ( Dacca )	June 3rd	Night	Tornado	8	The Government Destitutes' Hospital collapsed; eight patients died and sixteen were injured.
Kalna ( Bengal )	June 6th	Afternoon	Thunderstorm	1	A school boy died trapped inside a thatched hut which collapsed during the storm. Several huts were blown off. Mango crop damaged.
Karimour ( South Sylhet, Assam )	June 13th	...	Violent thunderstorm	311	Ninety people were injured. A building in which labourers were taking shelter collapsed.
Dahanu ( Bombay )	June 13th	Evening	Severe rainstorm	...	...
Munshiganj ( Dacca )	July 19th	Afternoon	Thunderstorm	...	A country boat capsized in the river Dhaleswari.
Lalmi	Reported on 22nd August	...	Thunderstorm	3	Three men and three buffaloes were struck dead by lightning.

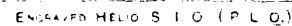


CIRCLE INDICATES POSITION OF CYCLONE OR DEPRESSION AT 9 HRS.

----- Depression

———— Storm.

———— Severe Storm.



CIRCLE INDICATES POSITION OF DEPRESSION AT 9 Hrs.

# PUBLICATIONS OF THE INDIA METEOROLOGICAL DEPARTMENT.

( Complete list, including those publications which are now out of print. )

Instructions to Observers at the 2nd and 3rd class observatories, edition 3 (1943). Re. 1-10 or 2s. 6d.	Departmental.
Cloud Atlas 2nd and revised edition (1937). Rs. 2-2 or 4s.*	Ditto.
Supplement to 2nd and revised edition (1938) As. 12 or 1s.	Ditto.
Cloud Atlas 3rd edition (1945) Rs. 2-2 or 3s. 6d.	Ditto.
Tables for the Reduction of Meteorological Observations in India, 3rd edition (1925) Rs. 5-8.*	Ditto.
Relative Humidity Tables (1937). As. 7 or 9d.*	Ditto.
Saturation Temperature Tables (1942). Re. 0-10 6	K. N. Rao.
Hygrometric Tables (1,000 mb). 1944.	Departmental.
Hygrometric Tables (900 mb). 1944.	Ditto.
Hygrometric Tables (800 mb). 1944.	Ditto.
Hygrometric Tables (700 mb). 1944.	Ditto.
Hygrometric Tables—Vapour Pressure.	Ditto.
Handbook of Cyclonic Storms in the Bay of Bengal for use of Sailors.	Sir John Eliot.
Vol. I Text 2nd Edition (1900). Rs. 4*	
Vol. II Plates 2nd Edition (1901). Rs. 1-8*	
Handbook of Cyclonic Storms in the Bay of Bengal (Abridged) 1943.	Ditto.
<b>Cyclone Memoirs—</b>	
Part I. Bay of Bengal Cyclone of May 20th to 28th, (1887). (1888). Re 1.*	Ditto.
Part II. Bay of Bengal Cyclone of August 21st to 28th, 1888. (1890). Rs. 3.	Ditto.
Part III. Bay of Bengal Cyclones of September 13th to 20th and October 27th to 31st, 1888 and Arabian Sea Cyclone of November 6th to 9th, 1888. (1890) Rs. 5	Ditto.
Part IV. An enquiry into the nature and course of storms in the Arabian Sea and a catalogue and brief history of all recorded storms in the Arabian Sea from 1848—1889. (1891). Rs. 3.	W. L. Dallas.
Part V. Account of three cyclones in the Bay of Bengal and Arabian Sea during November 1891. (1893.) Rs. 3.*	Sir John Eliot.
Report of the Midnapore and Burdwan Cyclone of the 15th and 16th of October 1874. (1875) Rs. 3.*	W. G. Wilson.
Report of the Vizagapatam and Backergunge Cyclones of October, 1876 (1877) Rs. 3.*	Sir John Eliot.
Report on the Madras Cyclone of May, 1877. (1879). Rs. 3*	Ditto.
Monthly weather charts of the Bay of Bengal and adjacent sea north of the equator, showing mean pressure, winds and currents. (1886) Rs. 5.*	H. F. Blanford.
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